enable the directors to place the Observatory in efficient working order. The work at the Scottish Marine Station continues to be prosecuted with energy and success. The Council had recommended that the grant from the Fishery Fund of the Society for the year ending November next be increased from 250*l.* to 300*l.* In November, 1884, an application on the part of the Tweed Salmon Commissioners was made to the Council for advice and assistance in investigations which the Commissioners had resolved to undertake into the salmon disease, and questions generally affecting the salmon fisheries; and the Commissioners were now carrying out a scheme of observations recommended by the Council.

Mr. John Murray read a report on the Scottish Marine Station, stating that there is every reason to be satisfied with the support which the Station is receiving and with the work done. A sum of 1456*l.* 13*s.* 1*d.* has up to the present time been received in subscriptions from the general public, to which is to be added the donation of 1000*l.* which led directly to the foundation of the Station. The Scottish Meteorological Society has promised an annual contribution of 300*l.* for three years, and for the present year the British Association has voted a grant of 100*l.* The Royal Society of London and the Government Grant Committee have sanctioned grants to the amount of 520*l.* to assist scientific men who will carry on their researches chiefly by means of the appliances and conveniences offered by the Station. The total expenditure up to the present time for the equipment and maintenance of the Station amounts to 2751*l.* 8*s.* 1*d.* The completion of the additions now in progress, and the maintenance of the station till November 1, 1885, will cost a further sum of 900*l.* At the request of a number of naturalists it is proposed to establish a temporary laboratory at Millport, on the Clyde, with sufficient accommodation for six workers, during the months of July and August of this year. The yacht *Medusa* will be in attendance to carry on dredging or assist in making observations in the estuary of the Clyde or any of the lochs which open into it. It is hoped that a permanent branch of the Station may ultimately be established at Millport.

Mr. H. R. Mill, B.Sc., submitted a detailed report of the meteorological part of the work carried on at the Marine Station, in which it was mentioned that plans of a new chemical laboratory were being prepared. A number of observations had been made to ascertain the temperature and salinity of the water at the bottom and the surface, and to find out the penetrability of light. It was found that a piece of photographic printing paper was completely blackened by exposing it to 109 hours of daylight at a depth of 30 feet, while at fifteen feet it was blackened by 42 hours' exposure. As to the temperature, the general law seemed to be that the range between summer and winter was nearly four times as great at Alloa and twice as great at Queensferry as it was at the Isle of May; and that in summer the temperature of the water fell steadily from Alloa to the May, and in winter rose with equal uniformity. The variations in salinity were very slight from Inchkeith to the mouth of the Forth, while from Inchgarvie to Alloa they were very great both between high and low tide, bottom and surface, at the same place and between differences on the Forth short distances apart.

A paper on anemometrical observations at Dundee was read by Mr. Cunningham, C.E., showing the diurnal velocity of the wind during the seasons and during cyclones and anticyclones. The daily maximum velocity occurred a little after 2 p.m., and the minimum from midnight to 6 a.m. During anticyclones the velocity of the wind was less during the night in summer than during winter, but stronger during the day. Mr. Cunningham also showed an elaborate diagram he had prepared for facilitating hygrometric calculations. A paper by Mr. Omond was read, on the formation of snow-crystals from fog on Ben Nevis (NATURE, vol. xxxi. p. 532), and a paper by Mr. Buchan, on the meteorology of Ben Nevis to February, 1884.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

CAMBRIDGE.—The Report of the Examiners at the last Cambridge Local Examinations speaks very favourably of the Euclid and Algebra papers. Trigonometry and Mechanics were done badly at some centres, but very well at others; the seniors did well in Statics, but the majority of candidates answered poorly in Astronomy.

In Practical Chemistry a larger proportion of juniors than last year gained high marks, and the percentage of failures was considerably less than in the theoretical paper. A few seniors sent in very good answers, but the greater number wrote answers to which it was difficult to attach a definite meaning. The phenomena and principles of Chemistry were evidently quite unreal to most of the senior candidates.

In Heat the juniors did rather worse than last year; bookwork was fairly done, but the simpler laws and principles were often converted into utter nonsense. The seniors as a whole answered badly; many were quite unfamiliar with most elementary facts and every-day occurrences, and had no notion of scientific methods or accurate reasoning.

In Statics, Hydrostatics, &c., the work was moderately well done; but the questions on Dynamics and Friction were very unsatisfactorily answered by the seniors.

Electricity and Magnetism showed a slight improvement.

Biology showed a large percentage of failures, owing to inadequate practical study.

Botany was ill done by most juniors; inaccurate descriptions and incorrect use of terminology were prominent. Many seniors showed fair knowledge of at least some part of the subject. Morphology and Classification of Flowering Plants, with descriptions of specimens, were the weakest parts of the examination.

In Zoology many of the junior candidates were quite unfit to enter for the examination; antiquated text-books and inefficient teaching were answerable for this. The seniors did slightly better, but had little practical knowledge of animals.

In Physical Geography all but a few did inferior papers, having learnt some facts and reasons by rote, without attempting to understand them. There was, in most cases, complete ignorance of the meaning of sections and contour lines.

UNIVERSITY OF NEW ZEALAND.—The annual meeting of the Senate of this University was recently held at Auckland, and extended over several days at the end of February and beginning of March. In consequence of the death of the Chancellor, Mr. Henry John Tancred, who had held office for twelve years, the Vice-Chancellor, Dr. James Hector, F.R.S., C.M.G., &c., was elected to the Chancellorship, and Rev. J. C. Andrew was chosen Vice-Chancellor. Dr. Hector, as Chancellor-Elect, announced, on the authority of Sir Julius Vogel, that the Government contemplated the establishment of four scholarships for the promotion of scientific and technical education, the management and administration of which were to be intrusted to the University. They would be tenable for eight years, and would be open to pupils from any school in the colony, or to competitors at any industrial exhibition, subject to an examination equal to the fourth standard of primary schools. Holders of these scholarships would spend the first four years at a secondary school, the next three in a University course, in preparation for a science degree, and the last year in preparation for taking honours in science.

The report of the Vice-Chancellor dealt mainly with local matters, but referred to the attendance of an ex-Vice-Chancellor as a representative of the University at the tercentenary celebration of the University of Edinburgh, and to the election by the Senate of new examiners during the previous year. It may not be generally known to English readers that all the degree examinations of this University are conducted entirely by papers set and printed in England, and that the answers are revised by the English examiners, who in all cases either are, or have been, examiners for the Universities of London, Cambridge, or Oxford. The standard maintained is, as nearly as possible, that of the University of London. More than eighty candidates presented themselves at the degree examinations last November from a population not exceeding half a million. The agent for the University in England is Mr. Wm. Lant Carpenter, B.A., B.Sc., of Harlesden, London, N.W.

SCIENTIFIC SERIALS

Journal of the Franklin Institute, No. 711, March, 1885.—E. A. Gieseler, on tidal theory and tidal predictions.—Prof. E. J. Houston, glimpses of the International Electrical Exhibition, No. VI. McDonough's telephonic inventions. This gives an interesting account of the instruments invented by McDonough between the years 1867 and 1876, the receiver of which anticipated in all its main features the form of receiver introduced by Graham Bell.—Prof. C. A. Young, physical constitution of the sun; a lecture delivered at the Electrical Exhibition, illustrated

with many cuts.—C. E. Fritts, on the Fritts selenium cells and batteries. These cells, in which the light enters through a film of gold-leaf appear to have a much lower resistance than any other selenium cell.—Prof. E. J. Houston, on Delaney's facsimile telegraphic transmission. This number of the journal is also accompanied by reports of the Examiners of certain Sections of the late Philadelphia Exhibition, including electric telegraphs, dental appliances, and applications of electricity to warfare.

Bulletin de l'Académie Royale de Belgique, February 7.—Experimental and analytical researches on the action and concussion of gases at various temperatures, by M. Hirn.—A study of the physical aspect of the planet Jupiter, by F. Terby.—Researches on the spectrum of carbon in the electric arc in connection with the spectra of the comets and the sun, by Ch. Fievez.—Remarks on the application of electricity to aerial navigation, by MM. Gérard, Van Weddingen and Jacquet.—On the agreement between atmospheric variations and the indications of colours in stellar scintillations, by Ch. Montigny.—On the presence of chiastolite rocks in the Lower Devonian formation of the Belgian Ardennes, by E. Dupont.—A new formula applicable to the development of functions, and especially of integers, by Ch. Lagrange.—Remarks on Massy's Glossary of the Egyptian novel of Setna, by M. Wagener.—The death of Don Juan of Austria, by Baron Kervyn de Lettenhove.

Engler's Botanische Jahrbücher, Sechster Band (1885), Heft 1.—Œmilius Kœhne, Lythraceæ, der Bau der Blüthen. Though the majority of the plants of this order are clearly entomophilous, the author is compelled to regard certain species as cleistogamic, *e.g.* species of *Ammannia* and *Rotala*.—A. Engler, Beiträge zur Flora des südlichen Japan und der Liu-kiu-Inseln.—J. C. Maximowicz, *Amaryllidaceæ sinico-japonicæ*.—A. G. Nathorst, Notizen über die Phanerogamenflora Grönlands im Norden von Melville Bay.—Litteraturbericht.

Heft 2.—T. F. Cheeseman, Die naturalisirten Pflanzen des Provincial-Districts Auckland. The author is inclined to conclude that the struggle between the naturalised and the indigenous flora will result in a limitation of the distribution of the indigenous species, rather than in their actual extinction. It must be confessed, however, that some few indigenous species appear to have already become extinct.—A. Peter, Ueber spontane und künstliche Gartenbastarde der Gattung *Hieracium*, sect. *Piloselloidea*.—F. Hildebrand, Ueber *Heteranthera zosterifolia*. The plant develops differently according as it grows in shallower or in deeper water; in the latter case float-leaves are formed, which differ widely in form from the ordinary leaves of the plant (one plate).—Lad. Celakovský, Linné's Antheil an der Lehre von der Metamorphose der Pflanze. The author concludes, from careful study of the writings of Linnæus and his pupils, that Linnæus definitely laid down the fundamental principle of metamorphosis before Wolff and Goethe.—Litteraturbericht.

Heft 3.—Franz Buchenau, Die Juncaceen aus Indien (plates 2 and 3).—E. Hackel, Die auf der Expedition S.M.S. *Gazelle* von Dr. Naumann gesammelten Gramineen.—H. Dingler, Der Aufbau des Weinstockes (plate 4).—A. Engler, Beiträge zur Kenntniss der Araceæ, vi.—A. Engler, Eine neue Schinopsis.—Beiblatt, short notice of Apospory, and of Treub's discoveries on the sexual reproduction of *Lycopodium*.—Litteraturbericht.

Journal de Physique, March.—Prof. Mascart, on the employment of the method, of damping for determining the value of the ohm.—L. Bleekrode, experimental researches on the refraction of liquefied gases. These are determined by the method of De Chaulnes.—L. Cailletet, new apparatus for preparing solid carbonic acid.—M. Vaschy, note on the theory of telephonic apparatus.—G. Meslin, on the definition of perfect gases, and on the resulting properties. The author objects to the usual statement of the combined laws, because it rests upon the definition of temperature, which again rests upon the properties of perfect gases. He proposes to deduce all gaseous laws from the following definitions:—"A perfect gas is one which perfectly obeys the law of Mariotte at all temperatures, and for which there is no change in the (true) specific heat when the volume changes."—R. T. Glazebrook, on a method of measuring the electrical capacity of a condenser (abstract from *Phil. Mag.*).—C. R. Alder-Wright and C. Thompson, on the variation of chemical affinity in terms of electromotive force (from *Phil. Mag.*).—W. Hankel, on the electricity developed during certain processes evolving gases.—P. Kramer, Descartes and the law of refraction of light. A polemic to show that the accusation made against Descartes of having appropriated the discovery of Snell is unfounded.—A. Genocchi, on some writings concerning the deviations of the pendulum and the experiment of Foucault.

Rivista Scientifico-Industriale, March 15.—Some experiments made by Prof. Tito Martini with an accumulator of the Planté type modified by Antonio Trevisan.—Influence of the capacity of the condensor on electric sparks, and their duration in connection with the hypothesis which considers electricity as an incompressible fluid, by Dr. Pietro Cardani.—Remarks on the Trouvé universal incandescent electric lamps (continued; two illustrations), by the Editor.—Experimental researches on the action of boric acid in the human system in connection with epidemics and contagious diseases, by Prof. Philippo Artimini.—On a method for extracting chlorophyll, by E. Guignet.—On certain so-called "thunderbolts" of volcanic origin recently found on Mount St. Angelo, near Baccano, and in some other places east of Lake Bracciano, by Prof. G. Strüver.

SOCIETIES AND ACADEMIES

London

Royal Society, April 16.—"On the Agency of Water in Volcanic Eruptions, with some Observations on the Thickness of the Earth's Crust from a Geological Point of View, and on the Primary Cause of Volcanic Action." By Joseph Prestwich, F.R.S., Professor of Geology in the University of Oxford.

That water plays an important part in volcanic eruptions is a well-established fact, but there is a difference of opinion as to whether it should be regarded as a primary or a secondary agent, and as to the time, place, and mode of its intervention. The author gives the opinions of Daubeny, Poulett Scrope, and Mallet, and, dismissing the first and last as not meeting the views of geologists, proceeds to examine the grounds of Scrope's hypothesis—the one generally accepted in this country—which holds that the rise of lava in a volcanic vent is occasioned by the expansion of volumes of high pressure steam generated in the interior of a mass of liquefied and heated mineral matter within or beneath the eruptive orifice, or that volcanic eruptions are to be attributed to the escape of high pressure steam existing in the interior of the earth. The way in which the water is introduced and where is not explained, but as the expulsion of the lava is considered to be due to the force of the imprisoned vapour, it is, of course, necessary that it should extend to the very base of the volcanic foci, just as it is necessary that the powder must be in the breech of the gun to effect the expulsion of the ball.

The author then proceeds to state his objections to this hypothesis. In the first place he questions whether it is possible for water to penetrate to a heated or molten magma underlying the solid crust. The stratigraphical difficulties are not insurmountable, although it is well known that the quantity of water within the depths actually reached in mines decreases, as a rule, with the depth, and is less in the Palæozoic than in the Mesozoic and Kainozoic strata.

The main difficulty is thermo-dynamical. As the elastic vapour of water increases with the rise of temperature, and faster at high than at low temperatures, the pressure—which at a depth of about 7500 feet and with a temperature (taking the thermometric gradient at 48 feet per 1° F.) of 212° F., would be equal to that of one atmosphere only—would at a depth of 15,000 feet and a temperature of 362°, be equal to $10\frac{1}{2}$ atmospheres, and at 20,000 feet and temperature of 467° would exceed 25 atmospheres. Beyond this temperature the pressure has only been determined by empirical formulæ, which, as the increase of pressure is nearly proportional to the fifth power of the excess of temperature, would show that the pressure, in presence of the heat at greater depths, becomes excessive. Thus, if the formulæ hold good to the critical point of water, or 773°, there would at that temperature be a pressure of about 350 atmospheres.

At temperatures exceeding 1000° F. and depth of about 50,000 feet, the experiments of M. H. St. Claire Deville have shown that the vapour of water, under certain conditions, probably undergoes disassociation, and, consequently, a large increase in volume. It would follow also on this that if the water-vapour had been subject to the long-continued action of the high temperatures of great depths, we might expect to meet with a less amount of steam and a larger proportion of its constituent gases than occurs in the eruptions. Capillarity will assist the descent, and pressure will cause the water to retain its fluidity to con-